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Electrode and photoelectrochemical cell with four layers, method for producing a printable paste which is free from water and binder agents, containing carbon and electrolyte or only carbon, and electrode

Patent claims

1. Procedure for manufacturing an electrolyte and carbon containing printable paste which is free from water, in the form of an electrode material for a counter electrode containing an electrolyte, for a photoelectrochemical cell, with the steps:
 - a) preparing a pure aprotic solvent or a aprotic solvent containing electrolytic salts and/or electrolytic auxiliary;
 - b) adding carbon black or conductive carbon black or graphite or a mixture of at less two of this components to the solvent, so as to produce a suspension;
 - c) stirring the solvent containing the carbon black or conductive carbon black or graphite or a mixture of at less two of this components to produce a substantially homogeneous suspension; and
 - d) treating the substantially homogenized suspension with ultrasound to produce a thick, printable paste.
2. Procedure according to claim 1, characterized by the fact that in the solvent the electrolyte salts and the electrolyte auxiliary are each present in a concentration for use in a photoelectrochemical cell, γ -butyrolactone is used as a aprotic solvent, to which is added 10 weight % of carbon black with a large surface of $20 \text{ m}^2/\text{g}$ or over or conductive carbon black with a maximum electrical resistance of $10^{-4} \Omega$, or a mixture of both, and 8 weight % of graphite with a maximum electrical resistance of $10^{-4} \Omega$, and the suspension is stirred for 5 minutes and then treated for 15 minutes with ultrasound.
3. Procedure for manufacturing an electrode, which already include the necessary electrolyte to operate a photoelectrochemical cell, in the form of an electrolyte containing electrode of a photoelectrochemical cell, which cover the following steps:
 - a) preparing an electrolyte and carbon containing printable paste or only a carbon containing printable paste which is free from water, in the form of a paste, which is manufactured in a procedure according to the claims 1 to 2;

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- b) applying and pressing the paste on a substrate or a substrate network, in the form of an electrode and at least one light absorbing layer containing, substrate network for a photoelectrochemical cell; and
- c) applying a graphite layer to the paste, preferably by dusting.

4. Procedure according to the claim 3, characterized by the fact that the paste is pressed with a material covered stamp on the substrate or the substrate network, characterized by the facts that the substrate or the substrate network consists of a light reflecting electrical isolation layer of TiO₂ or that the electrical isolating properties of the substrate or substrate network are increased additionally by layers of cloth, paper or plastic foils.

5. Module consisting of photoelectrochemical cells or other products, which contain a carbon and electrolyte or only a carbon containing printable paste, which was manufactured in a procedure according to the claims 1 to 2.